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# Reflector



**SIMPLE AMATEUR RADIO ASTRONOMY**

**HIGH SCHOOL AMATEUR ASTRONOMY**

**BLACK WIDOW PULSARS**

**A NOVEL BINOCULAR OBSERVING CHAIR DESIGN**

pattern that keeps repeating itself. In either case, these polygonal shapes can only form at a narrow range of wind-speed differences, temperatures, and pressures. Because these requirements are not usually met, none of the other gas giants in our Solar System have a polygon at either of their poles.

Inside the hexagon, the rapidly rotating atmosphere forms a hurricane-like vortex centered on the north pole. The pole itself is in the eye of the storm, an area around 400 miles in diameter that is clear of high clouds. Surrounding it is an eyewall of higher clouds that casts a shadow into the pole-eye, making it appear dark. Surrounding the eyewall, the winds travel the fastest near the eyewall, becoming slower farther from the pole. Although the polar region moves like a hurricane, it is caused by different mechanisms.

The overall rotation of the system triggers hundreds of small convective storms that surround Saturn's pole. Upwelling air currents in the hearts of these storms bring up large particulates from lower in Saturn's atmosphere, large enough to block the far-infrared thermal radiation coming from deep inside Saturn. This silhouettes the storms against the far-infrared heat radiation from Saturn's interior.

The hexagon has been there over 40 years [and there is no reason to believe that it will become unstable and dissipate any time soon. Along with the rings, the hexagon marks Saturn as one of the most visually stunning objects in our Solar System.

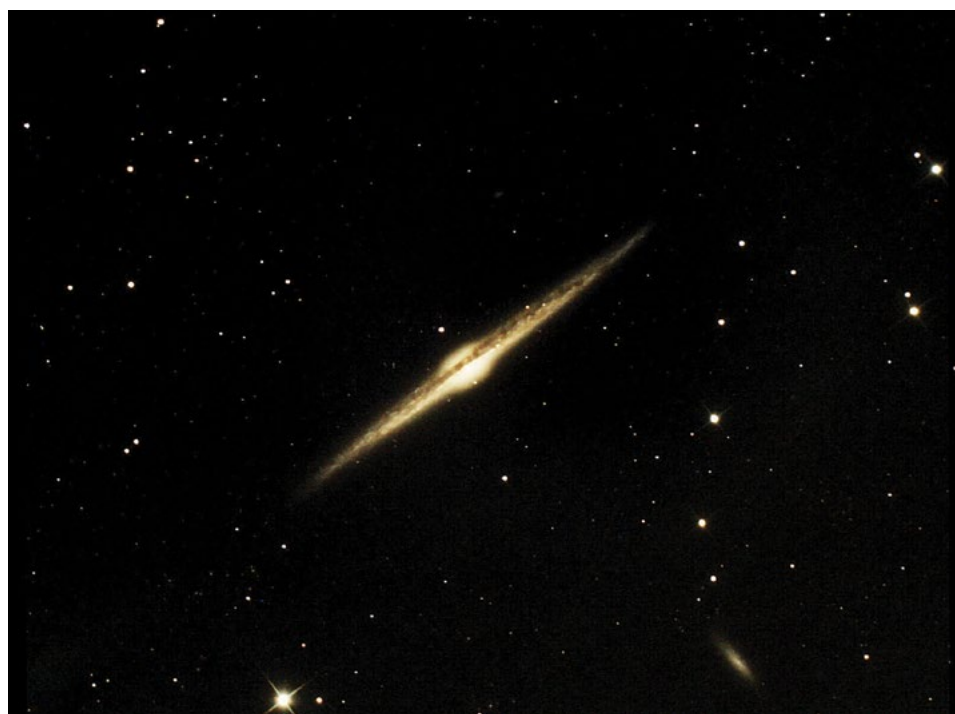
—Berton Stevens

## Deep-Sky Objects

### THE NEEDLE IN BERENICE'S HAIR

Coma Berenices is one of the faintest constellations in the sky: it contains no stars brighter than fourth magnitude. From dark sites, a large open star cluster several degrees in diameter known as Melotte 111 can be seen. Melotte 111 may be the source of the comparison to wispy hair, giving rise to the constellation's name. The brightest stars in the cluster are 5th and 6th magnitude, while the integrated magnitude is 1.79.

Without the interference from bright stars, nebulae, and the Milky Way, Coma Berenices is a haven for exploring galaxies. The constellation contains many bright galaxies, including the Messier objects M85, M88, M91, M98, M99, and M100. Coma Berenices is also home to the galaxy NGC 4565, known by many astronomers as the



best galaxy that Messier missed.

William Herschel discovered NGC 4565 in 1785. The galaxy is 16 by 3 arcminutes in size with magnitude estimates ranging from 9 to 10.5. Distance estimates to NGC 4565 range from 39 to 56 million light-years. The galaxy can be seen in 3-inch telescopes, but is best viewed in 8-inch or larger scopes.

NGC 4565 is one of the finest edge-on galaxies in the sky. It has a bright disk with a classic bright oval central bulge. Its razor-thin appearance gives rise to its common name, the Needle Galaxy. NGC 4565 has a very prominent dust lane running the length of the disk. The lane runs in front of the core, too, blocking views of the center of the galaxy.

The measured rotation of the galaxy is similar to that of our Milky Way galaxy. Therefore, the Needle Galaxy is thought to be comparable in mass (light and dark matter) to the Milky Way. Because we cannot see anything but the edge of NGC 4565, we don't know if it is a normal or barred spiral galaxy. Our home galaxy is a barred spiral.

The three brightest stars in Coma Berenices are Alpha (magnitude 4.31), Beta (4.25) and Gamma (4.34), which form a right triangle with Beta at the right angle. Along the hypotenuse of the triangle, the Needle Galaxy lies about 20 percent of the way from Gamma to Alpha. NGC 4565 also can be found 2.5 degrees east of the center of Melotte 111.

The image here of NGC 4565 was taken with an 8-inch f/8 Ritchey-Chrétien telescope with a 0.8× focal reducer/field flattener and an SBIG

ST-2000XCM CCD camera. The exposure was 220 minutes. In the image north is up and east to the left. The bright star near the bottom of the image is magnitude 9.1, about the same brightness as the brightest estimates for the galaxy's integrated magnitude (defocus your eyepiece and compare the two!). The star above the core is magnitude 13.5 and may not be visible in smaller telescopes. The fainter spiral galaxy below and to the right of the Needle is NGC 4562. NGC 4562's brightness is somewhere between magnitudes 13.5 and 14.4. It is 1.9 by 0.6 arcminutes in size and is a barred spiral galaxy. NGC 4562 may be the same distance as NGC 4565, making it a companion galaxy.

Capturing brighter galaxies at the eyepiece is always exciting. While exploring the plethora of magnificent galaxies along the Virgo-Coma Berenices border, take a gander a little farther north at the Needle Galaxy. You will find it just as mesmerizing as those magnificent Messier marvels.

—Dr. James R. Dine

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